# CHEMICAL HEALTH HAZARD

**Chemicals can exist in the form of**

- dusts, fumes
- liquids, mists
- gases, vapor



# Examples of chemical hazards found in construction work

- asbestos
- lead
- silica
- cadmium
- carbon Monoxide
- welding fumes
- spray paints
- cutting oil mists
- xylene vapor
- solvents

# Examples of health conditions and illnesses from exposure to chemical hazards

A health hazard can affect the entire body or many organs, or affect only specific tissues, organs, or parts of the body.

- Headaches
- Confusion
- Loss consciousness
- Dermatitis
- Lung irritation

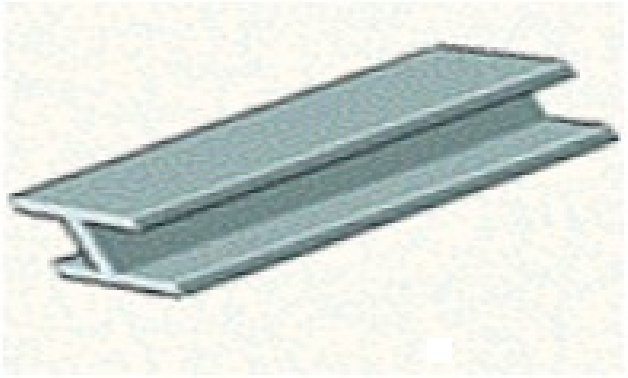
of

- Asbestosis
- Silicosis
- Cancer
- Liver damage
- Sterility

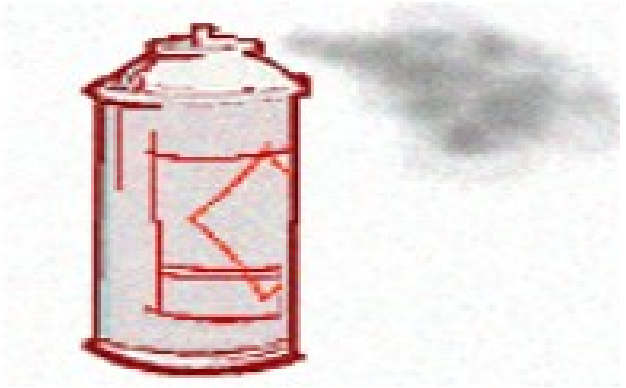
# CHEMICAL HEALTH HAZARD

- The degree of hazard associated with a particular chemical will depend on:
- Its physical properties
- Its toxicity
- The way it is used
- The environment in which it is encountered
- Chemicals may be found in solid, liquid, aerosol, or gas and vapor form.
- The degree of danger varies according to the form of the chemical and the factors discussed above

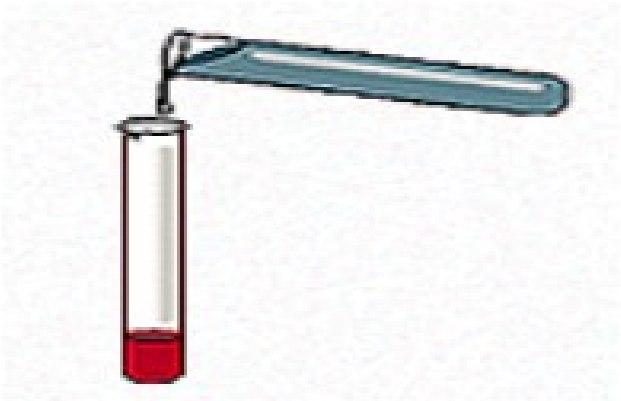
# CHEMICAL HEALTH HAZARD



Solids



Aerosols



Liquids




Vapors

# a. Solids

- **Lead-** Lead can become a human health hazard if the pipe is sanded

or welded, producing lead dust or fumes resulting in fatigue, anemia.

- **Asbestos-** The demolition of buildings with asbestos insulation or lagging has the potential for the release of massive amounts of lagging has the potential for the release of massive amounts of asbestos fiber when inhaled leads to asbestoses, lung cancer, mesothelioma-a type of lung cancer.
- **Cement-** The reaction of cement with water produces large amounts of heat as well as CO2. If proper care is not taken, this can lead to choking of the workers in congested area where mixing is done.

# b. Liquids

- Many liquids are hazardous in contact with the skin. They either damage the skin or they are easily absorbed through the skin
- Paints, varnishes etc generally get deposited on workers. The chemical ingredients like Isocyanates invariably get absorbed through the skin leading to dermatitis..
- Lead based paints constitute absorption of lead through skin.
- The contact with these liquids should be avoided. Use of protective clothing should be encouraged to counter these hazards
- In case the contact is unavoidable, adequate shower facilities should be provided

# c. Aerosols/Vapors/gas

- Silica dust can cause silicosis (scarring of lungs).
- Cement particles when inhaled cause asthma, and other lung diseases
- Exposure to saw fumes containing terpenes, a constituent of wood also causes chronic obstructive impairment in lung function
- Chronic exposure to wood dust can cause impaired nasal mucociliary clearance and nasal cancer.
- Liquids with a low vapor pressure may create a low airborne concentration and those with a high vapor pressure may produce high airborne concentrations.
- Almost all types of solvents used in paints, paint removing solutions, industrial coatings etc. evaporate and their inhalation also causes similar breathing related diseases.

- Carbon dioxide occurs in chalk and limestone. It results in oxygen deficiency. Fatal accidents may occur when workers enter manholes in surface water drainage system
- Hydrogen sulphide is highly present in sewers. High concentration
- causes death while low level causes irritation to eyes, nose, causes death while low level causes irritation to eyes, nose headache etc
- Nitrous fumes generally emerge with the use of explosives used during demolition or excavation (Blasting). Low concentration can cause bronchitis
- Gas masks depending upon the type of exposure are very suitable against these types of chemical hazards

- Harmful chemicals in the form of solid, liquid, gases, mists, dusts, fumes and vapours exert toxic effects by inhalation( breathing), absorption(through direct contact with the skin), or ingestion(eating and drinking).

**Airborne chemical hazards/contaminants exist as concentrated:**

- Dusts – formed from mechanical action
- Smoke – formed from combustion
- Fumes – formed from volatilizing metal
- Mists – tiny water droplets
- Vapors – evaporate of liquid
- Gases – particles without defined shape or volume
- Aerosols – atomized particulate or solids

# POTENTIALLY HAZARDOUS OPERATIONS AND ASSOCIATED AIR CONTAMINANTS[1]

| *Process types* | *Contaminant type* | *Contaminant examples* |
|---|---|---|
| ***Hot operations*** | | |
| Welding | Gases | Chromates |
| Chemical reactions | Particulates | Zinc and compounds |
| Soldering | (Dust, fumes, mists) | Manganese and compounds |
| Melting | | |
| Moulding | | |
| Burning | | |
| Galvanizing | | Hydrogen sulfide |
| Chemical reactions | | Sulfur dioxide |
| | | Carbon tetrachloride |

***Liquid operations***

| | | |
|---|---|---|
| Painting | Vapours | Benzene |
| Degreasing | Gases | Trichlorethylene |
| Dipping | Mists | Methylene chloride |
| Spraying | | 1,1,1-Trichloroethylene |
| Brushing | | Hydrochloric acid |
| Coating | | Sulfuric acid |
| Etching | | Hydrogen chloride |
| Cleaning | | Cyanide salts |
| Dry cleaning | | Chromic acid |
| Pickling | | Hydrogen cyanide |
| Plating mixing | | TDI, MDI |
| Galvanizing | | Hydrogen sulfide |
| Chemical reactions | | Sulfur dioxide |
| | | Carbon tetrachloride |

***Solid operations***

| | | |
|---|---|---|
| Pouring | Dusts | Cement |
| Mixing | | Quartz (free silica) |
| Separation | | Fibrous glass |
| Extraction | | |
| Crushing | | |
| Conveying | | |
| Loading | | |
| Bagging | | |

| | | |
|---|---|---|
| ***Pressurized spraying*** | | |
| Cleaning parts | Vapours | Organic solvents |
| Applying pesticides | Dust | Chlordane |
| Degreasing | Mist | Parathion |
| Sand blasting | | Trichloroethylene |
| Painting | | 1,1,1-Trichloroethane |
| | | Methylene chloride |
| | | Quartz (free silica, |
| ***Shaping operations*** | | |
| Cutting | Dusts | Asbestos |
| Grinding | | Beryllium |
| Filing | | Uranium |
| Milling | | Zinc |
| Moulding | | Lead |
| Sawing | | |
| Drilling | | |

# HAZARDOUS CHEMICAL EXPOSURES

- Are employees trained in the safe handling practices of hazardous chemicals ?
- Are employees aware of the potential hazards involving various chemicals stored or used in the workplace?
- Is employee exposure to chemicals kept within acceptable levels?
- Are eye wash fountains and safety showers provided in areas where corrosive chemicals are handled?

- Are all containers, such as vats and storage tanks labeled as to their contents--e.g.
- Are all employees required to use personal protective clothing and equipment when handling chemicals?
- Are flammable or toxic chemicals kept in closed containers when not in use?
- Are chemical piping systems clearly marked as to their content?

- Where corrosive liquids are frequently handled in open containers or drawn from storage vessels or pipelines; is adequate means readily available for neutralizing or disposing of spills or overflows properly and safely?
- Have standard operating procedures been established and are they being followed when cleaning up chemical spills?
- Where needed for emergency use, are respirators stored in a convenient, clean and sanitary location?

- Are employees prohibited from eating in areas where hazardous chemicals are present?
- Is personal protective equipment provided, used and maintained whenever necessary?
- If hazardous substances are used in your processes, do you have a medical or biological monitoring system in operation?
- Is there a Material Safety Data Sheet readily available for each hazardous